

Claims:

1. A method of modulating a multiplexed stream of robust and standard symbols, comprising the steps of:

providing a first and a second set of constellation points such that the statistics of an output signal modulated with a randomly selected one of said first set of constellation points look like the statistics of an output signal modulated with said second set of constellation points;

modulating each robust symbol of said multiplexed stream with a randomly selected one of said provided first set of constellation points; and

modulating each standard symbol of said multiplexed stream with a one of the provided constellation points of said second set of constellation points.

2. The method according to claim 1, wherein the second pre-determined set of constellation points is an 8 level vestigial sideband (8-VSB) ATSC standard set of eight constellation points.

3. The method according to claim 2, wherein the eight constellation points are $\{-7, -5, -3, -1, 1, 3, 5, 7\}$.

4. The method according to claim 3, wherein the first pre-determined set of constellation points is randomly chosen from the set of $\{\{-7, -5, -3, -1\}, \{1, 3, 5, 7\}\}$.

5. The method according to claim 1, wherein:

the step of modulating each robust symbol comprises the substeps of –

- i. generating bits to force a standard trellis encoder to output the randomly selected one of the first pre-determined set of constellation points,
- ii. inputting the robust symbol and the generated bits to a standard trellis encoder, and
- iii. modulating the robust symbol by the standard trellis encoder with the randomly selected one of the constellation points of the first pre-determined set of constellation points; and

the step of modulating each standard symbol comprises the substeps of –

- iv. inputting the standard symbol to the standard trellis encoder, and

- v. modulating the standard symbol by the standard trellis encoder with the one of the constellation points of the second pre-determined set of constellation points.

6. The method according to claim 5, wherein the second pre-determined set of constellation points is an 8 level vestigial sideband (8-VSB) ATSC standard set of eight constellation points

$\{-7, -5, -3, -1, 1, 3, 5, 7\}$.

7. The method according to claim 6, wherein the first pre-determined set of constellation points is randomly chosen from the set of $\{\{-7, -5, -3, -1\}, \{1, 3, 5, 7\}\}$.

8. A method for providing backward-compatible modulation, comprising the steps of: providing a multiplexed stream of at least one standard and at least one robust symbol; and modulating said multiplexed stream using multiple modulation types am such that the statistics of the output signal look like a standard signal.

9. The method according to claim 8, further comprising the step of broadcasting said modulated stream as an ATSC digital TV signal.

10. The method according to claim 8, wherein the step of modulating further comprises the substeps of:

randomly selecting one of the set of constellation points $\{\{-7, -5, -3, -1\}, \{1, 3, 5, 7\}\}$ to modulate each said at least one robust symbol of the stream; and

modulating each said at least one standard symbol using the set of constellation points $\{-7, -5, -3, -1, 1, 3, 5, 7\}$.

11. The method according to claim 10, further comprising the step of broadcasting said modulated stream as an ATSC digital TV signal.

12. An apparatus for 8-VSB like backward-compatible stream modulation, comprising:
- a preprocessor for receiving a multiplexed stream of at least one standard symbol and at least one robust symbol;
 - a standard trellis encoder operably interfaced to the preprocessor for encoding/mapping the multiplexed stream using multiple modulation types;
 - a control sequence generator operably connected to the preprocessor to direct the preprocessor to force the standard trellis encoder to output one of a pre-determined set of constellation points for each said at least one robust symbol such that statistics of an encoded/mapped stream output by the trellis encoder look like statistics of a standard 8-VSB stream.
13. The apparatus according to claim 12, wherein the pre-determined set of constellation points is selected from one of a randomly chosen set of $\{-7, -5, -3, -1\}, \{1, 3, 5, 7\}$.